THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No.32

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte BRIAN W. WOODMAN and JOHN F. HALL

Appeal No. 1997-3205
Application 08/389,545

HEARD: JANUARY 11, 2000

Before JERRY SMITH, FLEMING, and FRAHM, Administrative Patent Judges.

FRAHM, Administrative Patent Judge.

DECISION ON APPEAL

Appellants have appealed to the Board from the examiner's final rejection of claims 1 to 10, which constitute all of the pending claims in the application before us on appeal.

BACKGROUND

The subject matter on appeal is directed to a method for generating an uncertainty index corresponding to a degree of corrosion or failure of a tube array in a steam generator of a nuclear power plant using a statistical computation model (see specification, pages 1 to 2; Brief, pages 3 to 5).

Appellants recognized that conventional tube array failure modeling techniques suffer from the disadvantage that large uncertainties in values of deterministic (i.e., Weibull) parameters cause a "subsequent inability to obtain quantifiable confidence estimates of the minimum and maximum tube repair requirements" (see specification, page 2). Appellants' claimed method and system involve providing an improvement over prior art deterministic modeling (see appellants' Figure 4, showing conventional Weibull modeling) of incorporating a probabilistic variation to produce an uncertainty index (see appellants' Figure 5, showing confidence levels using Monte-Carlo technique). The method and system of claims 1 to 10 on appeal calculate and display such an uncertainty index to better predict failure rates of tubes in the steam generators so that unscheduled plant shut-downs can be avoided (see specification, pages 1 to 2). As indicated in the specification (page 7), the method and system for generating an uncertainty index performs a probabilistic computation on a constant parameter of the prior art deterministic model. Thus, a key difference between the prior art and the invention recited in representative independent claim 1 on appeal is that an uncertainty index is generated in the recited invention, as opposed to a best estimate curve (as in the prior art).

In general, appellant's invention recited in representative independent claim 1 on appeal provides a method for generating an index commensurate with tube array degradation over time, wherein the index is generated from a distribution of degradation values which are commensurate with an uncertainty as computed by a deterministic failure (i.e., Weibull) model (see claim 1 on appeal). By

defining a distribution of degradation values which surround an expected degradation value at a particular time point, the method of claim 1 is able to generate an index commensurate with an uncertainty at each time point, thereby providing data such as shown in appellants' Figure 5 (see tube array failure confidence level curves 38 and 40). Accordingly, appellants' uncertainty index provides the ability to treat uncertainties in the failure model parameters, as well as the ability to display and record a distributional presentation of the results with explicit confidence limits (see specification, page 4). As further discussed, infra, we find that the applied references to Clark and Maguire fail to teach or suggest at least this salient feature as it is recited in the claims on appeal.

Representative claim 1 is reproduced below:

1. A method for generating an index commensurate with a degree to which a tube array degrades over a period of time due to corrosion in a particular operating environment, comprising:

creating a data array defining a number of tubes in the tube array, a plurality of time points defining time intervals during which the degradation is to be assessed, and operating conditions that induce corrosion during each time interval;

computing an expected degradation value of the tube array over each of a plurality of time points using a deterministic failure model having at least one parameter that is assumed to have a constant value at each time point;

for each time point generating a plurality of values of said parameter that deviate from said assumed constant value;

for each time point, computing a plurality of degradation values using said deterministic failure model with each of said plurality of deviated values of said parameter, thereby defining a distribution of degradation values at said time point surrounding said expected degradation value at said time point; and

generating an index from said distribution of degradation values, commensurate with an uncertainty at each time point, in said expected degradation value as computed by said deterministic failure model.

The following references are relied on by the examiner:

Clark et al. (Clark)	5,050,108	Sept. 17, 1991
Maguire, Jr. et al. (Maguire)	5,331,579	Jul. 19, 1994 (effectively filed Aug. 2, 1989)

Claims 1 to 10 stand rejected under 35 U.S.C. § 103. As evidence of obviousness, the examiner relies upon Clark in view of Maguire.

Rather than repeat the positions of appellants and the examiner, reference is made to the Briefs and the Answers for the respective details thereof.[1]

OPINION

For the reasons generally set forth by appellants in the Brief, and for the reasons which follow, we will reverse the rejection of claims 1 to 10 under 35 U.S.C. § 103. As a consequence of our review, we are in general agreement with appellants that the applied references to Clark and Maguire would not have taught or suggested the method and system of appellants' claims 1 to 10 on appeal (see Brief, pages 7 to 8). More specifically, we find that neither Clark nor Maguire taken singly or in combination teach or suggest the salient feature of claim 1 on appeal of defining a distribution of

[1] We note that the after final amendment dated June 27, 1996, has been entered as per the Advisory Action of July 7, 1996. The Reply Brief of February 18, 1997, has been entered and considered by the examiner as indicated in the Supplemental Examiner's Answer dated April 1, 1997.

degradation values surrounding an expected degradation value at a particular time point to generate an index commensurate with an uncertainty at each time point, thereby providing an uncertainty index.

Appellants argue (Reply Brief, pages 4 to 5) that Clark fails to teach or suggest incorporating probabilistic considerations into parameters which are conventionally deemed constants in deterministic models. Appellants also argue (Reply Brief, pages 2 to 3) that Clark's Figures 2A and 2B fail to teach or suggest modifying a constant value of a deterministic model with a probabilistic deviation. We agree on both counts, and find that Clark fails to teach or suggest treating a constant or deterministic parameter as one which has plural deviant values around a best estimate value to create an uncertainty index as set forth in claim 1.

We are in agreement with appellants (Reply Brief, page 2) that Clark's Figure 2B, as described at column 2, lines 33 to 45 of that patent, constitutes curves which are computed based on deterministic models having constant parameters such as A, C, and E (constants employed in the deterministic formulas listed at column 5). Even assuming, for the sake of argument, that Clark's Figure 2B represents a probabilistic variation of a parameter (tube metal temperature in Figure 2B) of a deterministic model (such as that in Figure 2A), that parameter is not one which "is assumed to have a constant value at each time point" as required by claim 1 and as aptly pointed out by appellants (Reply Brief, pages 2 to 3).

We are also in agreement with appellants (Brief, page 10) that Maguire fails to teach or suggest

modifying a constant value of a deterministic model with a probabilistic deviation. Appellants are correct in stating that although Maguire teaches that deterministic calculations can be statistically or probabilistically based (see column 4, lines 10 to 14), Maguire still does not teach or suggest the feature recited in representative claim 1 of modifying a constant value of a deterministic model with a probabilistic deviation by defining a distribution of degradation values surrounding an expected degradation value at a particular time point to generate an index commensurate with an uncertainty at each time point.

Therefore, we find that the feature recited in claims 1 to 10 on appeal, of generating an index commensurate with tube array degradation over time by modifying constant deterministic degradation values using a probabilistic model, is neither taught nor would have been suggested by the applied prior art to Clark and Maguire.

Lastly, we are in agreement with appellants (Brief, pages 11 to 12 and 15) that Maguire fails to teach or suggest the salient feature of representative claim 1 of defining a distribution of degradation values surrounding an expected degradation value at a particular time point to generate an index commensurate with an uncertainty at each time point, thereby providing an uncertainty index. We are not persuaded that Maguire's disclosed optimization analysis (see Maguire, column 15) relied upon by the examiner (see Answer, page 10) is the same as appellant's claimed uncertainty index. We concluded that Maguire's teachings of optimization of plant operations and performance would not

have made it obvious to one of ordinary skill in the art to modify a constant value of a deterministic model with a probabilistic deviation by defining a distribution of degradation values surrounding an expected degradation value at a particular time point to generate an index commensurate with an uncertainty as recited in claim 1.

In view of the foregoing, the decision of the examiner rejecting claims 1 to 10 under 35 U.S.C. § 103 is reversed.

CONCLUSION

The decision of the examiner rejecting claims 1 to 10 under 35 U.S.C. § 103 over Clark in view of Maguire is reversed.

REVERSED

JERRY SMITH Administrative Patent Judge	)
MICHAEL R. FLEMING Administrative Patent Judge	) BOARD OF PATENT) APPEALS AND) INTERFERENCES

ERIC FRAHM)
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